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L2: Entry 1 of 2 File: JPAB Dec 10, 1996

*** TESTING *** DB=OPTX, PIECE=52 (J595)

PUB-NO: JP408324210A
DOCUMENT-IDENTIFIER: JP 08324210 A
TITLE: PNEUMATIC TIRE

PUBN-DATE: December 10, 1996

INVENTOR-INFORMATION:
NAME COUNTRY
HIMURO, YASUO

ASSIGNEE-INFORMATION:
NAME COUNTRY
BRIDGESTONE CORP

APPL-NO: JP07137882
APPL-DATE: June 5, 1995

INT-CL (IPC): B60 C 11/113; B60 C 11/04

ABSTRACT:

PURPOSE: To Provide a pneumatic tire whose drain performance particularly at cornering travel time is enhanced while maintaining excellent drain performance of a directional pattern.

CONSTITUTION: A first or second inclined main grooves 2 or 3 inversely inclined to the tire circumference is arranged in a tread part 1 of a tread. The first inclined main groove 2 is arranged at an angle of 10 to 30° to the tire circumference, and has a straight line-shaped steeply inclined part 2b extending toward the first tread end 4a positioned inside (6) of a vehicle, and the second inclined main groove 3 extends in a curve shape by crossing the first inclined main groove 2, and an angle formed by a tangent drawn in this second inclined main groove 2 and the tire circumference gradually increases in a range of 20 to 80° as it proceeds in the direction of the second tread end 4b from the starting end 3a.

First Hit

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L2: Entry 2 of 2 File: DWPI Dec 10, 1996

*** TESTING *** DB=OPTX, PIECE=35 (D196)

DERWENT-ACC-NO: 1997-082537
DERWENT-WEEK: 199708

TITLE: Pneumatic tyre of directional pattern with improved water draining performance - comprises first slant groove orientated at specific angle to circumferential direction and second slant groove curving across first slant groove

PATENT-ASSIGNEE:

ASSIGNEE	CODE
BRIDGESTONE CORP	BRID

PRIORITY-DATA: 1995JP-0137882 (June 5, 1995)

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PATENT-FAMILY:

	PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
☐	JP 08324210 A	December 10, 1996		008	B60C011/113

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
JP 08324210A	June 5, 1995	1995JP-0137882	

INT-CL (IPC): B60 C 11/04; B60 C 11/113

ABSTRACTED-PUB-NO: JP 08324210A
BASIC-ABSTRACT:

A pneumatic tyre of a directional pattern has the first (2) and the second (3) slant main grooves on the tread inclined oppositely to the tyre's circumferential direction, which are arranged to come into contact with the ground successively from their starting ends in the tread central region toward the tread edges. The first slant groove (2) is oriented 10-30 deg. to the tyre's circumferential direction and has a straight steep portion (2b) extended to the first tread edge (4a) placed inside (6) the car when fitted, while the second slant groove (3) is extended curvedly across the first slant grooves (2) and the angle between the tangent to the curved groove (3) and the tyre's circumferential direction increases from the starting end (3a) toward the second tread edge (4b) in the range from 20-80 deg. .

ADVANTAGE - Water draining performance, especially at cornering, is improved.

CHOSEN-DRAWING: Dwg.1/8

TITLE-TERMS: PNEUMATIC TYRE DIRECTION PATTERN IMPROVE WATER DRAIN PERFORMANCE COMPRISE FIRST SLANT GROOVE ORIENT SPECIFIC ANGLE CIRCUMFERENCE DIRECTION SECOND SLANT GROOVE CURVE FIRST SLANT GROOVE

DERWENT-CLASS: A95 Q11

CPI-CODES: A12-T01B;

ENHANCED-POLYMER-INDEXING:
Polymer Index [1.1] 018 ; H0124*R Polymer Index [1.2] 018 ; ND01 ; K9416 ; Q9999 Q9256*R Q9212 ; Q9999 Q9234 Q9212 ; K9905

SECONDARY-ACC-NO:
CPI Secondary Accession Numbers: C1997-026551
Non-CPI Secondary Accession Numbers: N1997-068400

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(43)公開日　平成８年(1996)12月10日

(51)Int.Cl.[6]		識別記号	庁内整理番号	ＦＩ		技術表示箇所
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	11/04		7504－3B		11/04	Ｄ
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審査請求　未請求　請求項の数７　ＯＬ　（全 ８ 頁）

(21)出願番号　特願平7－137882

(22)出願日　平成７年(1995)６月５日

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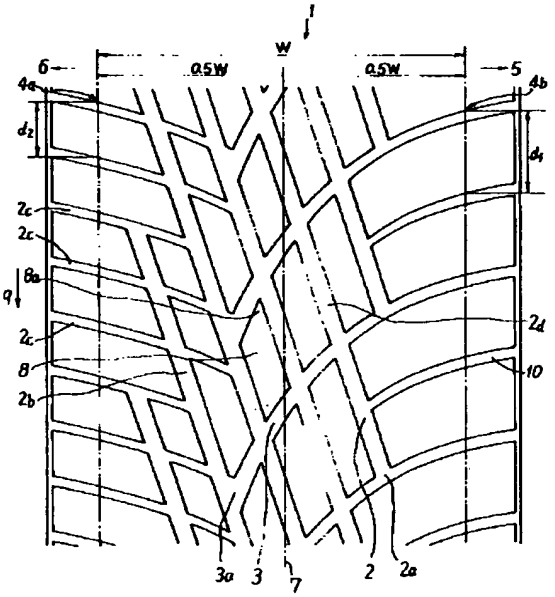
(54)【発明の名称】　空気入りタイヤ

(57)【要約】　（修正有）

【目的】　方向性パターンの優れた排水性を維持しつつ、特にコーナリング走行時の排水性を高めた空気入りタイヤを提供する。

【構成】　トレッド踏面部１に、タイヤ円周に対し逆傾斜で第一又は第二の傾斜主溝２，３を配置する。第一傾斜主溝２は、タイヤ円周に対し10～30°の角度で配置し、車両内側６に位置する第一トレッド端4aに向かって延びる直線状の急傾斜部2bを有し、第二傾斜主溝３は、第一傾斜主溝２を横切って曲線状に延び、この第二傾斜主溝２に引いた接線とタイヤ円周とのなす角度が、始端３ａから第二トレッド端４ｂの方向に向かうにつれて20～80°の範囲で漸増する。



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【特許請求の範囲】

【請求項１】　トレッド踏面部に、タイヤ円周に対し逆傾斜でそれぞれ第一又は第二のトレッド端に向かって延びる複数本の第一又は第二の傾斜主溝を、それぞれタイヤ円周を区分する間隔をおいて配置し、かつ、これらの各傾斜主溝が、その始端からトレッド端に向かって順次接地域内に入る配置になる、方向性パターンを有する空気入りタイヤにおいて、

タイヤの車両装着姿勢にて、第一傾斜主溝は、車両外側に位置する第二トレッド端とタイヤ赤道との間の領域内に位置する始端から、タイヤ円周に対し10～30°の角度で、車両内側に位置する第一トレッド端に向かって延びる直線状の急傾斜部を有し、

第二傾斜主溝は、第一トレッド端とタイヤ赤道との間の領域内に位置する始端から第二トレッド端の方向に向かい第一傾斜主溝を横切って曲線状に延び、この第二傾斜主溝に引いた接線とタイヤ円周とのなす角度が、始端から第二トレッド端の方向に向かうにつれて20～80°の範囲で漸増することを特徴とする非対称の方向性パターンを有する空気入りタイヤ。

【請求項２】　第一傾斜主溝を、始端から第一トレッド端の手前付近まで延びる急傾斜部と、この急傾斜部からタイヤ円周に対し比較的大きな角度で延び第一トレッド端に開口する緩傾斜部とで構成してなる請求項１に記載の空気入りタイヤ。

【請求項３】　第二傾斜主溝は、始端から実質的に連続して延び、第二トレッド端に開口する請求項１又は２に記載の空気入りタイヤ。

【請求項４】　第二傾斜主溝の溝幅は、始端から第二トレッド端に向かって漸減してなる請求項１、２、又は３に記載の空気入りタイヤ。

【請求項５】　第一傾斜主溝の始端は、タイヤ赤道からトレッド半幅の25～75％の範囲内の位置にあり、第二傾斜主溝の始端は、タイヤ赤道からトレッド半幅の50％の範囲内の位置にある請求項１～４のいずれか１項に記載の空気入りタイヤ。

【請求項６】　第二傾斜主溝の最大溝幅が、第一傾斜主溝の急傾斜部の溝幅と同等以下である請求項１～５のいずれか１項に記載の空気入りタイヤ。

【請求項７】　第二トレッド端に開口する溝の開口ピッチ長が、第一トレッド端に開口する溝の開口ピッチ長よりも大きい請求項１～６のいずれか１項に記載の空気入りタイヤ。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、トレッド踏面部に非対称の方向性パターンを有する空気入りタイヤに関するものであり、具体的には、他の性能を犠牲にすることなく、特にコーナリング走行時の排水性を高めて総合的な排水性能を向上させた高運動性の空気入りラジアルタイヤに関するものである。

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【０００２】

【従来の技術】空気入りタイヤに高排水性を付与するには、一般に、図７に示すように、トレッド踏面部に、タイヤ円周方向に延びるストレート溝１６ａ～１６ｅと、始端からトレッド端に向かって順次接地域内に入るような方向に傾斜して延びる傾斜溝１７ａ，１７ｂとを配設して、いわゆる方向性パターンを形成することが有用である。

【０００３】また、傾斜溝の配設形状は、トレッド中央域では、タイヤ円周に対する配設角度を小さくして、タイヤの前方及び後方への排水能力を高めるとともに、トレッド側方域では、前記角度を大きくして、両側方への排水能力を高めるようにすることがよいこと、及び、前記傾斜溝の他に、前記配設角度をより一層小さくした急傾斜部を有する超傾斜溝を組み合わせることによって、排水性が一層向上することは知られている。

【０００４】

【発明が解決しようとする課題】しかし、ここでいう排水性とは、主に直進走行時の排水性を意味しており、方向性パターンを有する従来タイヤにおいて、特にコーナリング走行時の排水性の向上を目的とした検討はほとんどなされていなかった。

【０００５】そのため、発明者が、コーナリング走行時の排水性を向上させるための鋭意検討を行った結果、コーナリング走行時の接地形状を考慮に入れた傾斜主溝の配設角度及び配設形状等の適正化を図ることにより、他の性能を犠牲にすることなく、コーナリング走行時の排水性を向上させることができることを見出した。

【０００６】本発明の目的は、コーナリング走行時のタイヤの接地形状を考慮に入れて傾斜主溝の配設角度及び配設形状等の適正化を図ることにより、他の性能を犠牲にすることなく、方向性パターン特有の優れた排水性を維持しつつ、特にコーナリング走行時の排水性を高めて総合的な排水性能を向上させた非対称方向性パターンを有する空気入りタイヤを提供することにある。

【０００７】

【課題を解決するための手段】上記目的を達成するため、本発明の空気入りタイヤは、トレッド踏面部に、タイヤ円周に対し逆傾斜でそれぞれ第一又は第二のトレッド端に向かって延びる複数本の第一又は第二の傾斜主溝を、それぞれタイヤ円周を区分する間隔をおいて配置し、かつ、これらの各傾斜主溝が、その始端からトレッド端に向かって順次接地域内に入る配置になり、タイヤの車両装着姿勢にて、第一傾斜主溝は、車両外側に位置する第二トレッド端とタイヤ赤道との間の領域内に位置する始端から、タイヤ円周に対し10～30°の角度で、車両内側に位置する第一トレッド端に向かって延びる直線状の急傾斜部を有し、第二傾斜主溝は、第一トレッド端とタイヤ赤道との間の領域内に位置する始端から第二ト

レッド端の方向に向かい第一傾斜主溝を横切って曲線状に延び、この第二傾斜主溝に引いた接線とタイヤ円周とのなす角度が、始端から第二トレッド端の方向に向かうにつれて20～80°の範囲で漸増する。

【０００８】また、第一傾斜主溝を、始端から第一トレッド端の手前付近まで延びる急傾斜部と、この急傾斜部からタイヤ円周に対し比較的大きな角度で延び第一トレッド端に開口する緩傾斜部とで構成してなること、第二傾斜主溝は、始端から実質的に連続して延び、第二トレッド端に開口すること、第二傾斜主溝の溝幅は、始端から第二トレッド端に向かって漸減してなること、第一傾斜主溝の始端は、タイヤ赤道からトレッド半幅の25～75％の範囲内の位置にあり、第二傾斜主溝の始端は、タイヤ赤道からトレッド半幅の50％の範囲内の位置にあること、第二傾斜主溝の最大溝幅が、第一傾斜主溝の急傾斜部の溝幅と同等以下であること、第二トレッド端に開口する溝の開口ピッチ長が、第一トレッド端に開口する溝の開口ピッチ長よりも大きいこと、がより好ましい。なお、ここでいう第一トレッド端に開口する溝とは、第一傾斜主溝の他、第一トレッド端に開口する全ての溝を含めることとし、また、第二トレッド端に開口する溝とは、第二傾斜主溝の他、第二トレッド端に開口する全ての溝を含めることとする。

【０００９】図１に、本発明にしたがう空気入りタイヤの代表的なトレッドパターンの一部を示し、図中１はトレッド踏面部、２は第一傾斜主溝、３は第二傾斜主溝、４ａは第一トレッド端、４ｂは第二トレッド端、５は車両外側、６は車両内側、７はタイヤ赤道である。

【００１０】この空気入りタイヤは、トレッド踏面部１に、タイヤ円周に対し逆傾斜でそれぞれ第一又は第二のトレッド端４ａ又は４ｂに向かって延びる複数本の第一傾斜主溝２及び第二傾斜主溝３を、それぞれタイヤ円周を区分する間隔をおいて配置したものであり、また、このタイヤは、各傾斜主溝２又は３が、その始端２ａ又は３ａから第一又は第二のトレッド端４ａ又は４ｂに向かって順次接地域内に入るように車両に装着して使用することを条件とする。

【００１１】このタイヤを車両に装着したとき、第一傾斜主溝２は、車両外側５に位置する第二トレッド端４ｂとタイヤ赤道７との間の領域内に位置する始端２ａから、タイヤ円周に対し10～30°の角度で、車両内側６に位置する第一トレッド端４ａに向かって延びる直線状の急傾斜部２ｂを有している。

【００１２】第一傾斜主溝２の始端２ａは、タイヤ赤道７からトレッド半幅 0.5Wの25～75% の範囲内の位置にあることが好ましい。

【００１３】また、第一傾斜主溝２は、始端２ａから第一トレッド端４ａの手前位置（好ましくは第一トレッド端４ａからトレッド半幅 0.5Wの15～50％の範囲の位置）まで延びる急傾斜部２ｂと、この急傾斜部２ｂから

タイヤ円周に対し比較的大きな角度（好ましくは60～80°の角度）で延び第一トレッド端４ａに開口する緩傾斜部２ｃ（図１では３本）とで構成することが好ましい。

【００１４】第二傾斜主溝３は、第一トレッド端４ａとタイヤ赤道７との間の領域内に位置する始端３ａから第二トレッド端４ｂの方向に向かい第一傾斜主溝２を横切って曲線状に延び、この第二傾斜主溝３に引いた接線とタイヤ円周とのなす角度が、始端３ａから第二トレッド端４ｂの方向に向かうにつれて20～80°の範囲（具体的には、始端３ａ位置で20～30°の範囲、第二トレッド端４ｂ位置で70～80°の範囲とする。）で漸増するように第２傾斜主溝３を配設する。

【００１５】第二傾斜主溝３の始端３ａは、タイヤ赤道７からトレッド半幅 0.5Wの50％の範囲内の位置にあることが好ましい。

【００１６】第二傾斜主溝３は、少なくとも４本の第一傾斜主溝２と交差する配置にすることが好ましく、また、第二トレッド端４ｂに開口するまで、実質的に連続して延びる配置にすることが好ましい。

【００１７】加えて、第二傾斜主溝３の溝幅を始端３ａから第二トレッド端４ｂに向かって漸減させること、第二傾斜主溝３の最大溝幅を第一傾斜主溝２の急傾斜部２ｂの溝幅と同等以下にすること、及び、第二トレッド端４ｂに開口する溝の開口ピッチｄ１を第一トレッド端４ａに開口する溝の開口ピッチｄ２よりも大きくすることが好ましい。

【００１８】

【作用】方向性パターンを有するタイヤは概して優れた排水性を有しているが、この排水性は、主に直進走行時の排水性を意味しており、コーナリング走行時の排水性については特に考慮したものではないことは前述した。

【００１９】そこで、発明者は、方向性パターン特有の直進走行時の優れた排水性は確保しつつ、特にコーナリング走行時における排水性を向上させるための検討を行う研究を行った結果、コーナリング走行時の接地形状との関係を考慮しつつ、傾斜溝の配設角度及び配設形状等の適正化を図ることにより、他の性能を犠牲にすることなく、コーナリング走行時における排水性を向上させることができることを見出したので、以下に説明する。

【００２０】まず、従来タイヤのトレッドパターン上に接地形状ラインを描いた図を図７及び図８に示し、図７が直進走行時の接地形状１８ａ、図８がコーナリング走行時の接地形状１８ｂを示す。

【００２１】直進走行時の接地形状１８ａは、両トレッド端４ａ，４ｂにわたって接地長がほぼ等しい矩形形状となり、一方、コーナリング走行時の接地形状１８ｂは、車両外側に位置する踏面部分の接地圧が高くなるため、車両内側の接地長が、車両外側の接地長に比し短くなり、接地した踏面部分に占める車両外側に位置する踏面部分がグリップ力を担う割合が大きくなるため、車両

外側に位置する踏面部分の陸部剛性を高めることが必要であり、さらに、急旋回走行時のように、タイヤに作用する横力が著しく大きい場合には、車両内側に位置する踏面部分が接地せずに浮き上がりがちになる。

【００２２】発明者は、このようなコーナリング走行時の接地形状の場合の排水機構について調べたところ、コーナリング走行時における排水性は、図６に示すようにタイヤの踏込み側接地ライン１９の前方への排水能力によって大きく左右されることを見出し、このため、傾斜溝を、踏込み側接地ライン１９に対して直交する方向２０に沿って配設することによって、コーナリング走行時における排水性が向上することが判明した。

【００２３】そこで、本発明の空気入りタイヤは、タイヤの車両装着姿勢にて、第一傾斜主溝２を、車両外側５に位置する第二トレッド端４ｂとタイヤ赤道７との間の領域内に位置する始端２ａから、タイヤ円周に対し10～30°の角度の方向、すなわちコーナリング走行時のタイヤの踏込み側接地ライン１９に対して直交する方向２０に直線状に配設することにより、直進走行時の排水性を悪化させることなく、コーナリング走行時の排水能力が高まる。第一傾斜主溝２の前記角度の限定理由は、10°未満だとコーナリング走行時の排水効果が薄れるからであり、30°を超えると直進走行時の排水性が悪化するからである。

【００２４】また、この第一傾斜主溝２だけでは、通常のリブパターンと同様にタイヤ幅方向のエッジ成分が不足し、駆動・制動性等が十分でないため、第二傾斜主溝３を、第一トレッド端４ａとタイヤ赤道７との間の領域内に位置する始端３ａから第二トレッド端４ｂの方向に向かって第一傾斜主溝２を横切って配置することにより、十分な駆動・制動性等の性能が得られる。

【００２５】さらに、第二傾斜主溝３に引いた接線とタイヤ円周とのなす角度が、始端３ａから第二トレッド端４ｂの方向に向かうにつれて20～80°の範囲で漸増するようにすることで、トレッド中央域に位置するブロック陸部の十分な剛性と、タイヤ側方への高排水性の双方を満足させることができる。第二傾斜主溝３の前記角度の限定理由は、20°未満だとブロック陸部８の角部のうち、最後に接地する角部８ａが鋭角になりすぎ、十分な陸部剛性が得られないようになるからであり、一方、80°を超えるとタイヤ側方への排水性が悪化するからである。

【００２６】加えて、第一傾斜主溝２の始端２ａを、タイヤ赤道７からトレッド半幅 0.5Wの25～75%の範囲内の位置に配置することが好ましい。第一傾斜主溝２の前記始端２ａ位置は、25%未満だと第一傾斜主溝２の配設長さが短すぎて十分な排水性を確保することができなくなり、また、75%を超えると車両外側５のトレッド側方域に位置するブロック陸部の剛性が不足するからである。

【００２７】第二傾斜主溝３の始端３ａは、タイヤ赤道７からトレッド半幅 0.5Wの50%の範囲内の位置に配置することが好ましい。前記始端３ａ位置が、50%を超えると始端から接地端までが長くなり過ぎ排水（外側への）効率が悪化する。

【００２８】第二傾斜主溝３は、少なくとも４本の第一傾斜主溝２と交差する配置にすることが、十分な排水性を確保する上で好ましく、また、直進走行時とコーナリング走行時の双方におけるタイヤ側方への排水性を確保するため、第二トレッド端４ｂに開口するまで、実質的に連続して延びる配置にすることが好ましい。

【００２９】なお、車両外側に位置するブロック陸部の剛性を高めてコーナリング時の操縦安定性をより一層高める必要がある場合には、第二傾斜主溝３の溝幅を始端３ａから第二トレッド端４ｂに向かって漸減させること、第二傾斜主溝３の最大溝幅を第一傾斜主溝２の急傾斜部２ｂの溝幅と同等以下にすること、及び、第二トレッド端４ｂに開口する溝の開口ピッチｄ１を第一トレッド端４ａに開口する溝の開口ピッチｄ２よりも大きくすることが好ましい。

【００３０】

【実施例】本発明にしたがう空気入りタイヤの具体的な実施例を図面を参照しながら説明する。

・実施例１

実施例１の空気入りタイヤは、図１に示すトレッドパターンを有し、タイヤサイズが 225／50R16 、トレッド幅が 200㎜であり、第一傾斜主溝２は、溝幅が10，溝深さが８㎜であり、タイヤ赤道７から54㎜だけ車両外側にある始端２ａ位置から、タイヤ円周に対し18°の配設角度で第一トレッド端４ａの手前位置（第一トレッド端４ａから20㎜の位置）にわたって延びる直線状の急傾斜部２ｂと、この急傾斜部２ｂを横切り第一トレッド端４ａに開口するまで延びる３本の緩傾斜部２ｃとで構成されている。緩傾斜部２ｃは、いずれも前記配設角度を65～75°，溝幅を4.5 ～5.0㎜ ，溝深さを6.5㎜ とした。第二傾斜主溝３は、第二トレッド端４ｂに開口するまで曲線状に延び、溝幅が9㎜（始端３ａ位置）から６㎜（第二トレッド端４ｂ位置）まで漸減し、タイヤ赤道７から27㎜の距離にある始端３ａ位置から第二トレッド端４ｂに向かって、タイヤ円周に対する第二傾斜主溝３に引いた接線の角度が25～75°に漸増し、溝深さが 6.5㎜である配設形状とした。加えて、隣接する２本の第二傾斜主溝のピッチを２等分する位置で、第二トレッド端４ｂから第一傾斜主溝２に開口するまで延びる補助溝１０を配置し、この補助溝１０の、溝幅を６～６㎜，配設角度を60～75°，溝深さを6.5㎜ とする補助溝１０を配置した。また、第二トレッド端４ｂへの開口ピッチ長ｄ１を45㎜，第一トレッド端４ａへの開口ピッチ長ｄ２を30㎜とした。なお、本発明はトレッド踏面部に特徴があるため、他のタイヤ構造については、従来の空気入りラジア

ルタイヤとほぼ同様の構造のものを用いた。

【００３１】・実施例２

実施例２の空気入りタイヤは、図２に示すトレッドパターンを有し、第一傾斜主溝２は、３本の緩傾斜部２ｃが、急傾斜部２ｂから第一トレッド端４ａに開口するまで互いに平行に延び、緩傾斜部２ｃは、いずれも前記配設角度を65～75°，溝幅を 4.5～5.0㎜ ，溝深さを6.5㎜ とし、第二傾斜主溝３は、溝幅が８㎜(始端３ａ位置) から６㎜(第二トレッド端４ｂ位置) まで漸減し、始端３ａ位置がタイヤ赤道７から２４㎜だけ車両内側にあり、隣接する２本の第二傾斜主溝のピッチを２等分する位置で、第二トレッド端４ｂから第一傾斜主溝２に向かって延び陸部内で終端する補助溝１０を配置し、この補助溝１０の、配設角度を70～75°とし、加えて、第一傾斜主溝２の急傾斜部の始端２ａから同一方向に補助溝１０に開口するまで延びる第一細溝１１と、急傾斜部の終端２ｄから同一方向に延びる第二細溝１２とを配設し、これらの細溝１１，１２の、溝幅を２㎜，配設角度を18°，溝深さを５㎜とし、前記開口ピッチ長ｄ１を45㎜，前記開口ピッチ長ｄ２を30㎜としたこと以外は実施例１に示すタイヤとほぼ同様の構造とした。

【００３２】・実施例３

実施例３の空気入りタイヤは、図３に示すトレッドパターンを有し、第一傾斜主溝２は、その急傾斜部２ｂから第一トレッド端４ａに開口するまで延びる１本の緩傾斜部$2c_1$と、急傾斜部の始端２ａから同一方向に延びる第二細溝１２から第一トレッド端４ａに開口するまで延びる２本の緩傾斜部$2c_2$, $2c_3$を有し、緩傾斜部$2c_1$, $2c_2$, $2c_3$は、いずれも前記配設角度を65～75°，溝幅を５㎜，溝深さを6.5㎜ とし、第二傾斜主溝３は、溝幅が10㎜（始端３ａ位置）から6㎜(第二トレッド端４ｂ位置）まで漸減し、隣接する２本の第二傾斜主溝のピッチを２等分する位置で、第二トレッド端４ｂから第一傾斜主溝２に向かって延び陸部内で終端する補助溝１０を配置し、この補助溝１０の、配設角度を70～75°とし、加えて、第一傾斜主溝２の急傾斜部の始端２ａから同一方向に補助溝１０に開口するまで延びる第一細溝１１を配設し、この第一細溝１１の、溝幅を2㎜,配設角度を18°，溝深さを５㎜とし、前記開口ピッチ長ｄ１を45㎜，前記開口ピッチ長ｄ２を30㎜としたこと以外は実施例１に示すタイヤとほぼ同様の構造とした。

【００３３】・実施例４

実施例４の空気入りタイヤは、図４に示すトレッドパターンを有し、第一傾斜主溝２の３本の緩傾斜部２ｃの溝幅を５㎜とし、第二傾斜主溝３は、溝幅が１０㎜(始端３ａ位置）から６㎜（第二トレッド端４ｂ位置）まで漸減し、タイヤ赤道７から43㎜だけ車両内側にある始端３ａ位置から第二トレッド端４ｂに向かって、タイヤ円周に対する第二傾斜主溝３に引いた接線の角度が20～75°に漸増し、隣接する２本の第二傾斜主溝のピッチを２等分する位置で、第二トレッド端４ｂから第一傾斜主溝２に向かって延び陸部内で終端する補助溝１０を配置し、この補助溝１０の、配設角度を70～75°とし、加えて、第一傾斜主溝２の始端２ａから同一方向に補助溝１０に開口するまで延びる第一細溝１１を配設し、この第一細溝１１の、溝幅を２㎜，配設角度を18°，溝深さを５㎜とし、前記開口ピッチ長ｄ１を45㎜，前記開口ピッチ長ｄ２を30㎜としたこと以外は実施例１に示すタイヤとほぼ同様の構造とした。

【００３４】・実施例５

実施例５の空気入りタイヤは、図５に示すトレッドパターンを有し、第一傾斜主溝２は、その急傾斜部２ｂから第一トレッド端４ａに開口するまで延びる２本の緩傾斜部$2c_1$, $2c_2$を有し、緩傾斜部$2c_1$, $2c_2$は、いずれも前記配設角度を６５～７５°，溝幅を５㎜，溝深さを6.5㎜ とし、第二傾斜主溝３は、溝幅が10㎜(始端３ａ位置）から６㎜（第二トレッド端４ｂ位置）まで漸減し、タイヤ赤道７から43㎜の距離にある始端３ａ位置から第二トレッド端４ｂに向かって、タイヤ円周に対する第二傾斜主溝３に引いた接線の角度が20～75°に漸増し、隣接する２本の第二傾斜主溝のピッチを２等分する位置で、第二トレッド端４ｂから第一傾斜溝２に向かって延びる補助溝１０を配置し、この補助溝１０の、配設角度を70～75°とし、加えて、第二トレッド端４ｂから31㎜の位置に、タイヤ円周と平行に延びる第一周溝１３を配設し、さらに、第一トレッド端４ａから３１㎜の位置に、第一傾斜主溝２の緩傾斜部$2c_2$, $2c_1$間にわたってタイヤ円周と平行に延びる第二周溝１４とこの第二周溝１４から第一トレッド端４ａに向かって延びる緩傾斜溝１５を配設し、第一及び第二の周溝１３，１４の、溝幅を２㎜，溝深さを５㎜とし、緩傾斜溝１５の、前記配設角度を65～75°，溝幅を５㎜，溝深さを6.5㎜ とし、前記開口ピッチ長ｄ１を45㎜，前記開口ピッチ長ｄ２を30㎜としたこと以外は実施例１に示すタイヤとほぼ同様の構造とした。

【００３５】・従来例

従来例の空気入りタイヤは、図７に示すトレッドパターンを有し、タイヤサイズが 225／50R16、トレッド幅が 200㎜ であり、トレッド踏面部には、タイヤ円周方向に延びる５本のストレート溝１６ａ～１６ｅと、各トレッド端４ａ，４ｂからそれぞれ２本の周溝１６ａと１６ｂ，１６ｅと１６ｄをそれぞれ横切って延び陸部内で終端する複数本の傾斜溝１７ａ，１７ｂをタイヤ円周を区分する間隔をおいて配置した対称形の方向性パターンを形成したものであり、ストレート溝１６ａ～１６ｅの、溝幅がそれぞれ10.5㎜，11.5㎜，4.0㎜，11.5㎜，10.5㎜であり、溝深さがいずれも８㎜であり、また、傾斜溝１７ａ，１７ｂは、ともに溝幅が 4.5㎜，溝深さが 6.5㎜，タイヤ円周に対する配設角度を50°～80°とし、トレッドパターン以外のタイヤ構造については実施例１の

タイヤとほぼ同様な構造とした。

【００３６】・試験方法

上述した供試タイヤについて、乾燥路面における（ドライ）操縦安定性と、湿潤路面における直進走行時及びコーナリング走行時の排水性の評価を行うための試験を行った。試験は、タイヤ内圧を2.2kgf/cm²、タイヤ荷重を実車２名乗車相当とする条件の下で行い、乾燥路面における操縦安定性は、乾燥状態のサーキットコースを各種走行モードによりスポーツ走行し、このときのテストドライバーのフィーリングによって評価し、また、直進走行時の排水性は、水深５mmの湿潤路面を時速80kmと90kmで走行時の接地面の残存面積を測定し、これによって評価し、さらに、コーナリング走行時の排水性は、水深５mmの８０Rの湿潤路面を走行する際の限界横Gを測定し、これによって評価した。これらの試験結果を表１に示す。なお、表中の数値はいずれの評価項目とも従来例を 100とした指数比で示してあり、これらの数値はいずれも大きいほど優れている。

【００３７】

【表１】

	操縦安定性	排水性A*1	排水性B*2
従来例	１００	１００	１００
実施例１	１０５	１１０	１２０
実施例２	１０７	１０５	１１２
実施例３	１０８	１０４	１１１
実施例４	１０７	１０７	１１７
実施例５	１０３	１０８	１０３

*1：直進走行時

*2：コーナリング走行時

【００３８】表１の結果から、実施例１～５は、従来例に対し、コーナリング走行時の排水性が著しく優れており、ドライ操縦安定性と直進走行時の排水性についても優れている。

【００３９】

【発明の効果】本発明によれば、他の性能を犠牲にすることなく、コーナリング走行時の排水性を含めた総合的な排水性能が高まり、湿潤路面での操縦安定性が向上し、安全性がより一層高まった。この発明は、特にサーキット走行のように大きな横力が頻繁に作用するような用途に使用するのに適している。

【図面の簡単な説明】

【図１】本発明に従う代表的な空気入りタイヤのトレッド踏面部の一部を展開した図である。

【図２】実施例２の空気入りタイヤのトレッド踏面部の一部を展開した図である。

【図３】実施例３の空気入りタイヤのトレッド踏面部の一部を展開した図である。

【図４】実施例４の空気入りタイヤのトレッド踏面部の一部を展開した図である。

【図５】実施例５の空気入りタイヤのトレッド踏面部の一部を展開した図である。

【図６】図１に示すタイヤのトレッド踏面部の一部を展開したものと、さらにコーナリング走行時における接地形状とを示した図である。

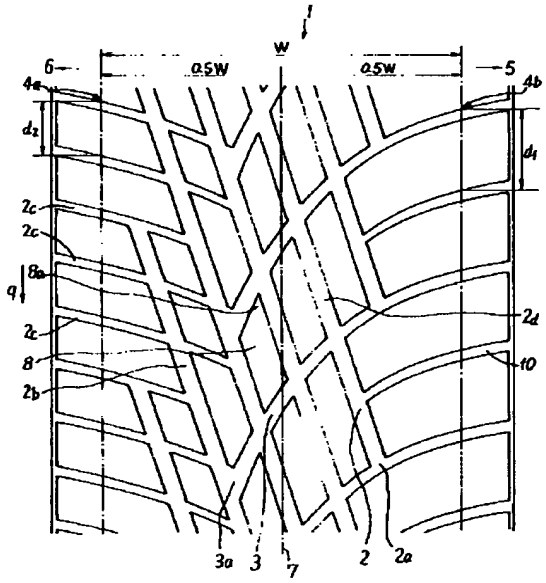
【図７】従来例の空気入りタイヤのトレッド踏面部の一部を展開したものと、さらに直進走行時における接地形状とを示した図である。

【図８】従来例の空気入りタイヤのトレッド踏面部の一部を展開したものと、さらにコーナリング走行時における接地形状とを示した図である。

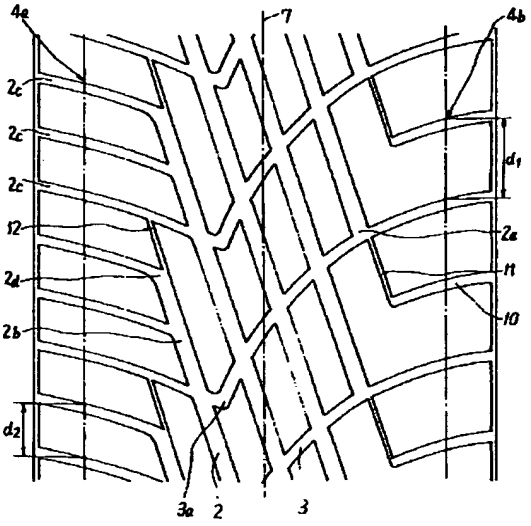
【符号の説明】

１　トレッド踏面部
２　第一傾斜主溝
３　第二傾斜溝
４ａ　第一トレッド端
４ｂ　第二トレッド端
５　車両外側
６　車両内側
７　タイヤ赤道
８　ブロック陸部
９　タイヤの回転方向
１０　補助溝
１１　第一細溝
１２　第二細溝
１３　第一周溝
１４　第二周溝
１５　緩傾斜溝
１６ａ～１６ｅ　ストレート溝
１７ａ，１７ｂ　傾斜溝
１８ａ，１８ｂ　接地形状
１９　踏込み側接地ライン
２０　踏込み側接地ラインに直交する方向

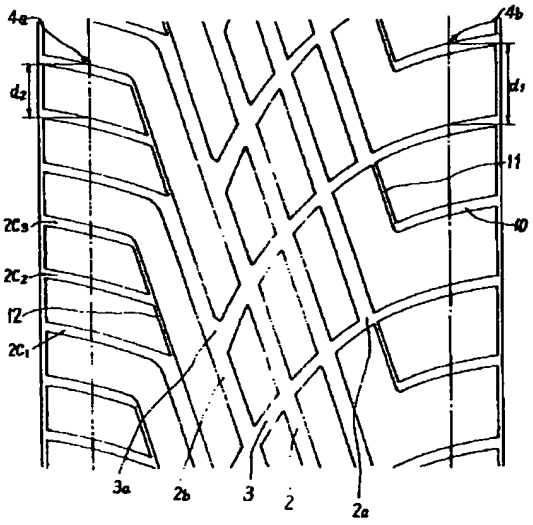
【図1】


W
0.5W
0.5W
6
5
4a
4b
d2
d1
2c
2c
8a
q
2c
8
2b
2d
10
3a
3
7
2
2a

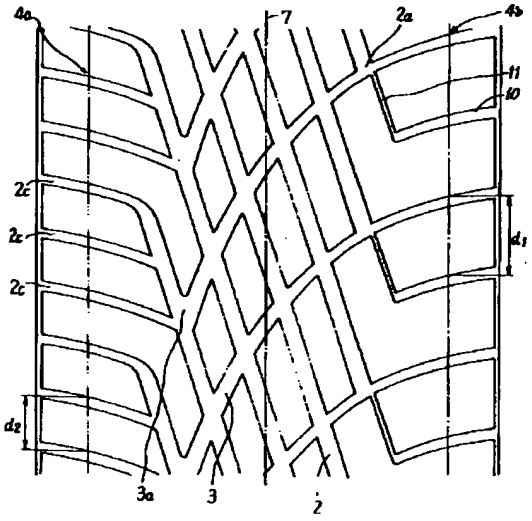
【図2】


4a
7
4b
2c
2c
2c
12
2d
2b
d2
d1
2a
11
10
3a
2
3

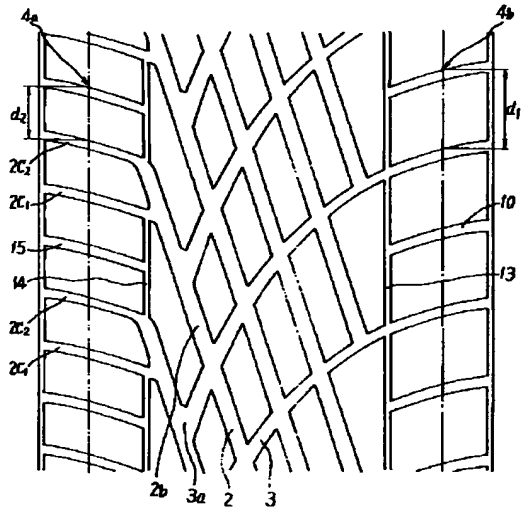
【図3】


4a
4b
d2
d1
11
10
2c3
2c2
12
2c1
3a
2b
3
2
2a

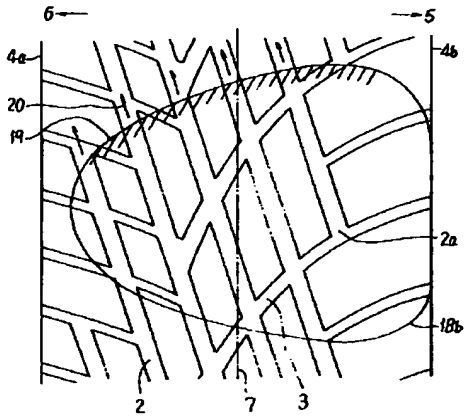
【図4】


4a
7
2a
4b
11
10
2c
2c
2c
d1
d2
3a
3
2

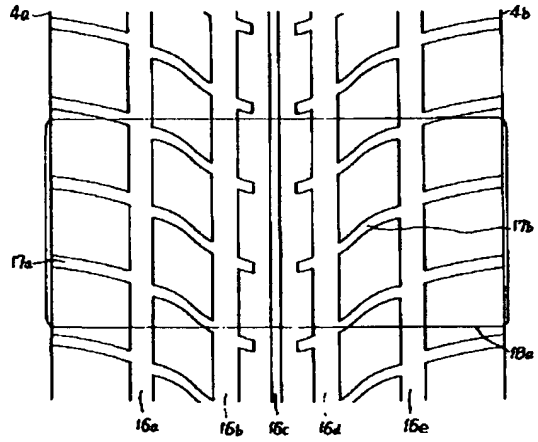
【図5】


4a
4b
d2
d1
2C2
2C1
10
15
13
14
2C2
2C4
2b
3a
2
3

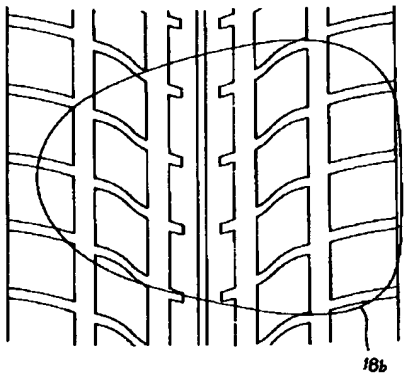
【図6】


6
5
4a
4b
20
19
2a
18b
2
7
3

【図7】


4a
4b
17b
17a
18a
16a
16b
16c
16d
16e

【図8】


18b

* NOTICES * machine translation for Japan 8-324210

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the radial-ply tire containing air of high maneuverability which raised the wastewater nature at the time of cornering transit, and raised the synthetic wastewater engine performance especially, without specifically sacrificing other engine performance in the tread tread section about the pneumatic tire which has an unsymmetrical directivity pattern.
[0002]
[Description of the Prior Art] In order to give high wastewater nature to a pneumatic tire, as shown in drawing 7 , generally it is useful to arrange in the tread tread section the straight slots 16a-16e which extend in a tire circumferencial direction, and the inclination slots 17a and 17b which incline and extend in the direction into which it goes within sequential touch-down toward a tread edge from the start edge, and to form the so-called directivity pattern in it.
[0003] The arrangement configuration of an inclination slot moreover, in a tread central region While making the arrangement angle to the tire circumference small and heightening the wastewater capacity to the front and the back of a tire, in a tread side region It is known by combining the super-inclination slot which has the steep slope section to which said angle was enlarged and heightening the wastewater capacity to the method of both sides made still smaller said arrangement angle other than a good thing and said inclination slot that wastewater nature will improve further.
[0004]
[Problem(s) to be Solved by the Invention] However, wastewater nature here mainly meant the wastewater nature at the time of rectilinear propagation transit, and most especially examination aiming at improvement in the wastewater nature at the time of cornering transit was not made in the tire conventionally which has a directivity pattern.
[0005] Therefore, it found out that the wastewater nature at the time of cornering transit could be raised, without sacrificing other engine performance by attaining rationalization of the arrangement angle of the inclination major groove which took the touch-down configuration at the time of cornering transit into consideration, an arrangement configuration, etc., as a result of inquiring wholeheartedly, in order that an artificer may raise the wastewater nature at the time of cornering transit.
[0006] It is for providing about the pneumatic tire which it has in the unsymmetrical directivity pattern which raised the wastewater nature at the time of cornering transit, and raised the synthetic wastewater engine performance especially, the purpose of this invention maintaining the outstanding wastewater nature peculiar to a directivity pattern without sacrificing other engine performance by attaining rationalization of the arrangement angle of an inclination major groove, an arrangement configuration, etc., taking the touch-down configuration of the tire at the time of cornering transit into consideration.
[0007]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, a pneumatic tire of this invention The two or more firsts or second inclination major groove prolonged toward the first or second tread edge in the tread tread section to the tire circumference, respectively in a reverse slope A gap which classifies the tire circumference, respectively is set and arranged. And each of these inclination major grooves It becomes the arrangement which enters within sequential touch-down toward a tread edge from the start edge. With a vehicles wearing posture of a tire the first inclination major groove As opposed to the start edge located in a field between the second tread edges and the tire equator which are located in a vehicles outside to the tire circumference at an angle of 10-30 degrees It has the steep slope section of the shape of a straight line prolonged toward the first tread edge located in the vehicles inside. The second inclination major groove Cross the first inclination major groove toward the direction of the second tread edge from the start edge located in a field between the first tread edge and the tire equator, and it extends in the shape of a curve. An angle of the tangent and the tire circumference which were lengthened to this second inclination major groove to make increases gradually in 20-80 degrees as it goes in the direction of the second tread edge from the start edge.
[0008] Moreover, the steep slope section prolonged from the start edge to near this side of the first tread edge in the first inclination major groove, Coming to constitute from the gradual slope section which is prolonged from this steep slope section at a comparatively big angle to the tire circumference, and carries out a opening to the first tread edge, and the second inclination major groove A flute width of extending continuously substantially from the start edge and carrying out a opening to the second tread edge, and the second inclination major groove The start edge of coming to gradually decrease from the start edge toward the second tread edge, and the first inclination major groove It is in a location of 25 - 75% of within the limits of tread half width from

the tire equator. The start edge of the second inclination major groove The maximum flute widths of that it is in a location of 50% of within the limits of tread half width from the tire equator and the second inclination major groove are a flute width of the steep slope section of the first inclination major groove, and below equivalent, Opening pitch length of a slot which carries out a opening to the second tread edge is more desirable than being larger than opening pitch length of a slot which carries out a opening to the first tread edge, and **. In addition, suppose [slot / which carries out a opening to the first tread edge here] that all slots that carry out a opening are included in the second tread edge besides the second inclination major groove with a slot which presupposes that all slots that carry out a opening are included in the first tread edge besides the first inclination major groove, and carries out a opening to the second tread edge.

[0009] some typical tread patterns of a pneumatic tire which follows this invention at drawing 1 -- being shown -- one in drawing -- the tread tread section and 2 -- for the first tread edge and 4b, as for a vehicles outside and 6, the second tread edge and 5 are the first inclination major groove and 3 / the second inclination major groove and 4a / the vehicles inside and 7] the tire equator.

[0010] This pneumatic tire two or more first inclination major grooves 2 and the second inclination major groove 3 which are prolonged in the tread tread section 1 toward tread edge 4of first or ** second a, or 4b to the tire circumference, respectively in a reverse slope A gap which classifies the tire circumference, respectively is set and arranged, and it is contingent [on using this tire, equipping vehicles, as entered in each inclination major groove 2 or 3 within sequential touch-down toward tread edge 4of first or ** second a, or 4b from that start edge 2a or 3a].

[0011] When vehicles are equipped with this tire, the first inclination major groove 2 has steep slope section 2b of the shape of a straight line prolonged toward first tread edge 4a which is 10-30 degrees in angle, and is located in the vehicles inside 6 to the tire circumference from start edge 2a located in a field between second tread edge 4b located in the vehicles outside 5, and the tire equator 7.

[0012] Start edge 2a of the first inclination major groove 2 is the tread half width from the tire equator 7. 25 - 75% of 0.5W It is desirable that it is in a location within the limits.

[0013] Moreover, steep slope section 2b to which the first inclination major groove 2 extends to this side location (it is the tread half width from first tread edge 4a preferably location of 15 - 50% of range of 0.5W) of start edge 2a to first tread edge 4a, It is desirable to constitute from gradual slope section 2c (drawing 1 3) which is prolonged from this steep slope section 2b at a comparatively big angle (preferably angle of 60-80 degrees) to the tire circumference, and carries out a opening to first tread edge 4a.

[0014] The second inclination major groove 3 crosses the first inclination major groove 2 toward the direction of start edge 3a to second tread edge 4b located in a field between first tread edge 4a and the tire equator 7, and is prolonged in the shape of a curve. An angle of the tangent and the tire circumference which were lengthened to this second inclination major groove 3 to make is the range of 20-80 degrees (specifically, it considers as the range of 70-80 degrees in a start edge 3a location in the range of 20-30 degrees, and a second tread edge 4b location.) as it goes in the direction of start edge 3a to second tread edge 4b. The 2nd inclination major groove 3 is arranged so that it may increase gradually.

[0015] Start edge 3a of the second inclination major groove 3 is the tread half width from the tire equator 7. It is desirable that it is in a location of 50% of within the limits of 0.5W.

[0016] It is desirable to make it arrangement which intersects at least four first inclination major grooves 2, and it is desirable to make it arrangement prolonged continuously substantially until it carries out the opening of the second inclination major groove 3 to second tread edge 4b.

[0017] In addition, a thing for which a flute width of the second inclination major groove 3 is dwindled toward second tread edge 4b from start edge 3a, It is desirable to make the maximum flute width of the second inclination major groove 3 into a flute width of steep slope section 2b of the first inclination major groove 2 below equivalent and to make it larger than the opening pitch d2 of a slot which carries out the opening of the opening pitch d1 of a slot which carries out a opening to second tread edge 4b to first tread edge 4a.

[0018]

[Function] Although the tire which has a directivity pattern had the generally excellent wastewater nature, this wastewater nature mainly meant the wastewater nature at the time of rectilinear propagation transit, and mentioned above that it was not what was taken into consideration especially about the wastewater nature at the time of cornering transit.

[0019] Then, the wastewater nature which the artificer excelled at the time of rectilinear propagation transit peculiar to a directivity pattern securing By attaining rationalization of the arrangement angle of an inclination slot, an arrangement configuration, etc., taking into consideration relation with the touch-down configuration at the time of cornering transit, as a result of doing research which performs examination for raising the wastewater nature especially at the time of cornering transit Since it found out that the wastewater nature at the time of cornering transit could be raised, without sacrificing other engine performance, it explains below.

[0020] First, drawing which drew touch-down configuration Rhine on the tread pattern of a tire conventionally is shown in drawing 7 and drawing 8 , drawing 7 shows touch-down configuration 18a at the time of rectilinear propagation transit, and drawing 8 shows touch-down configuration 18b at the time of cornering transit.

[0021] Touch-down configuration 18a at the time of rectilinear propagation transit becomes the rectangle configuration where touch-down length is almost equal, over both the tread edges 4a and 4b. On the other hand, touch-down configuration 18b at the time of cornering transit Since the touch-down length of the vehicles inside compares with the touch-down length of a vehicles outside, and becomes short, since the ground pressure of the tread portion located in a vehicles outside becomes high, and the rate

that the tread portion located in the vehicles outside occupied into the grounded tread portion bears the grip force becomes large, It is required to raise the **** rigidity of the tread portion located in a vehicles outside, and further, like [at the time of steep-turn transit], when the lateral force which acts on a tire is remarkable and large, it tends to come floating, without the tread portion located in the vehicles inside grounding.

[0022] When an artificer investigates about the wastewater device in the case of the touch-down configuration at the time of such cornering transit, the wastewater nature at the time of cornering transit Being greatly influenced by the wastewater capacity ahead of treading-in side touch-down Rhine 19 of a tire, as shown in drawing 6 A header, this sake, It became clear that the wastewater nature at the time of cornering transit improved by arranging an inclination slot along the direction 20 which intersects perpendicularly to treading-in side touch-down Rhine 19.

[0023] The pneumatic tire of this invention with the vehicles wearing posture of a tire then, the first inclination major groove 2 From start edge 2a located in the field between second tread edge 4b located in the vehicles outside 5, and the tire equator 7 The wastewater capacity at the time of cornering transit increases without worsening the wastewater nature at the time of rectilinear propagation transit by arranging in the shape of a straight line to the tire circumference in the direction 20 with an angle of 10-30 degrees, i.e., the direction which intersects perpendicularly to treading-in side touch-down Rhine 19 of the tire at the time of cornering transit. The limited reason of said angle of the first inclination major groove 2 is that the wastewater effect at the time of cornering transit will fade if it is less than 10 degrees, and is because the wastewater nature at the time of rectilinear propagation transit will get worse if it exceeds 30 degrees.

[0024] The edge components of the width-of-tire direction run short like the usual rib pattern only by this first inclination major groove 2. Moreover, since drive / braking nature etc. is not enough, Engine performance, such as sufficient drive / braking nature, is obtained by crossing and arranging the first inclination major groove 2 toward the direction of second tread edge 4b from start edge 3a located in the second inclination major groove 3 in the field between first tread edge 4a and the tire equator 7.

[0025] Furthermore, the both sides of sufficient rigidity of the block land section located in a tread central region and the high wastewater nature to the tire side can be satisfied to make it increase gradually in 20-80 degrees as the angle of the tangent and the tire circumference which were lengthened to the second inclination major groove 3 to make goes in the direction of start edge 3a to second tread edge 4b. The limited reason of said angle of the second inclination major groove 3 is that corner 8a grounded at the last among the corners of the block land section 8 will become an acute angle too much, and sufficient **** rigidity will cease to be acquired if it is less than 20 degrees, and is because the wastewater nature to the tire side will get worse on the other hand if it exceeds 80 degrees.

[0026] In addition, it is the tread half width from the tire equator 7 about start edge 2a of the first inclination major groove 2. It is desirable to arrange in the location of 25 - 75% of within the limits of 0.5W. It is because the rigidity of the block land section located in the tread side region of the vehicles outside 5 runs short if its arrangement length of the first inclination major groove 2 is too short of stopping to secure sufficient wastewater nature when said start edge 2a location of the first inclination major groove 2 is less than 25%, and it exceeds 75%.

[0027] Start edge 3a of the second inclination major groove 3 is the tread half width from the tire equator 7. It is desirable to arrange in the location of 50% of within the limits of 0.5W. If said start edge 3a location exceeds 50%, from the start edge to a touch-down edge will become long too much, and wastewater effectiveness (to outside) will get worse.

[0028] When making it the arrangement which intersects at least four first inclination major grooves 2 secures sufficient wastewater nature, it is desirable, and it is desirable to make it the arrangement prolonged continuously substantially until it carries out the opening of it to second tread edge 4b, in order that the second inclination major groove 3 may secure the wastewater nature to the tire side in the both sides at the time of rectilinear propagation transit and cornering transit.

[0029] in addition, when it is necessary to raise the rigidity of the block land section located in a vehicles outside and the driving stability at the time of a cornering needs to be raised further The flute width of the second inclination major groove 3 is dwindled toward second tread edge 4b from start edge 3a, It is desirable to make the maximum flute width of the second inclination major groove 3 into the flute width of steep slope section 2b of the first inclination major groove 2 below equivalent and to make it larger than the opening pitch d2 of the slot which carries out the opening of the opening pitch d1 of the slot which carries out a opening to second tread edge 4b to first tread edge 4a.

[0030]

[Example] The concrete example of the pneumatic tire according to this invention is explained referring to a drawing.

- The pneumatic tire of example 1 example 1 has the tread pattern shown in drawing 1 , and tire size 225 / 50R16, and tread width of face It is 200mm. The first inclination major groove 2 A flute width is 10, From the start edge 2a location which whose channel depth is 8mm and is located only 54mm from the tire equator 7 on the vehicles outside Steep slope section 2b of the shape of a straight line prolonged covering this side location (location of first tread edge 4a to 20mm) of first tread edge 4a to the tire circumference at the arrangement angle of 18 degrees, It consists of gradual slope section of three 2c prolonged until it crosses this steep slope section 2b and carries out a opening to first tread edge 4a. Each of gradual slope section 2c is said arrangement angle, 65-75 degrees It is 6.5mm about 4.5-5.0mm and a channel depth in a flute width. It carried out. It is prolonged in the shape of a curve until it carries out the opening of the second inclination major groove 3 to second tread edge 4b. a flute width -- 9mm (start edge 3a location) from -- 6mm (second tread edge 4b location) It gradually decreases. up to -- From the start edge 3a location which is in the distance of 27mm from the tire equator 7, toward second tread edge 4b, the angle of the tangent drawn to the second inclination major groove 3 to the tire circumference increases gradually at 25-75 degrees, and a channel depth It considered as the arrangement configuration which is 6.5mm. In addition, the supplemental groove 10 prolonged

until it carries out a opening to the first inclination major groove 2 from second tread edge 4b is arranged in the location which divides the pitch of the two adjoining second inclination major grooves into two equally, and it is 6-6mm about the flute width of this supplemental groove 10, It is an arrangement angle, 60-75 degrees It is 6.5mm about a channel depth. The supplemental groove 10 to carry out has been arranged. Moreover, it is 45mm about the opening pitch length d1 to second tread edge 4b, The opening pitch length d2 to first tread edge 4a was set to 30mm. In addition, since this invention had the feature in the tread tread section, about other tire structures, the thing of the almost same structure as the conventional radial-ply tire containing air was used.

[0031] The pneumatic tire of example 2 example 2 has the tread pattern shown in drawing 2 . - The first inclination major groove 2 Gradual slope section of three 2c is mutually prolonged in parallel until it carries out a opening to first tread edge 4a from steep slope section 2b. Gradual slope section 2c All are said arrangement angle, 65-75 degrees Flute width It is 6.5mm about 4.5-5.0mm and a channel depth. It carries out. The second inclination major groove 3 a flute width -- 8mm (start edge 3a location) from -- 6mm (second tread edge 4b location) up to -- it gradually decreasing, and a start edge 3a location being in the vehicles inside, and the pitch of the two adjoining second inclination major grooves only 24mm, from the tire equator 7, in the location equally divided into two The supplemental groove 10 which is prolonged toward the first inclination major groove 2 from second tread edge 4b, and carries out termination in the land department is arranged. The first rill 11 prolonged until it makes the arrangement angle of this supplemental groove 10 into 70-75 degrees, in addition carries out a opening to the supplemental groove 10 in the same direction from start edge 2a of the steep slope section of the first inclination major groove 2, The second rill 12 prolonged in the same direction from 2d of termination of the steep slope section is arranged. It is 2mm about the flute width of these rills 11 and 12, It is an arrangement angle, 18 degrees A channel depth is set to 5mm and it is 45mm about said opening pitch length d1, It considered as the almost same structure as the tire shown in an example 1 except having set said opening pitch length d2 to 30mm.

[0032] The pneumatic tire of example 3 example 3 has the tread pattern shown in drawing 3 . - The first inclination major groove 2 the one gradual slope section 2c1 prolonged until it carries out a opening to first tread edge 4a from the steep slope section 2b The two gradual slope sections 2c2 and 2c3 which are prolonged until it carries out a opening to first tread edge 4a from the second rill 12 prolonged in the same direction from start edge 2a of the steep slope section It has. The gradual slope section 2c1, 2c2, and 2c3 It is all said arrangement angle, 65-75 degrees It is 6.5mm about 5mm and a channel depth in a flute width. It carries out. The second inclination major groove 3 a flute width -- 10mm (start edge 3a location) from -- 6mm (second tread edge 4b location) up to -- it gradually decreasing and the pitch of the two adjoining second inclination major grooves in the location equally divided into two The supplemental groove 10 which is prolonged toward the first inclination major groove 2 from second tread edge 4b, and carries out termination in the land department is arranged. The first rill 11 prolonged until it makes the arrangement angle of this supplemental groove 10 into 70-75 degrees, in addition carries out a opening to the supplemental groove 10 in the same direction from start edge 2a of the steep slope section of the first inclination major groove 2 is arranged. They are 2mm and an arrangement angle about the flute width of this first rill 11, 18 degrees A channel depth is set to 5mm and it is 45mm about said opening pitch length d1, It considered as the almost same structure as the tire shown in an example 1 except having set said opening pitch length d2 to 30mm.

[0033] The pneumatic tire of example 4 example 4 has the tread pattern shown in drawing 4 , and sets three flute widths of gradual slope section 2c of the first inclination major groove 2 to 5mm. - The second inclination major groove 3 a flute width -- 10mm (start edge 3a location) from -- 6mm (second tread edge 4b location) It gradually decreases. up to -- It goes to second tread edge 4b from the start edge 3a location which is in the vehicles inside only 43mm from the tire equator 7. The pitch of the two second inclination major grooves by which the angle of the tangent drawn to the second inclination major groove 3 to the tire circumference increases gradually and adjoins 20-75 degrees in the location equally divided into two The supplemental groove 10 which is prolonged toward the first inclination major groove 2 from second tread edge 4b, and carries out termination in the land department is arranged. The first rill 11 prolonged until it makes the arrangement angle of this supplemental groove 10 into 70-75 degrees, in addition carries out a opening to the supplemental groove 10 in the same direction from start edge 2a of the first inclination major groove 2 is arranged. It is 2mm about the flute width of this first rill 11, It is an arrangement angle, 18 degrees A channel depth is set to 5mm and it is 45mm about said opening pitch length d1, It considered as the almost same structure as the tire shown in an example 1 except having set said opening pitch length d2 to 30mm.

[0034] The pneumatic tire of example 5 example 5 has the tread pattern shown in drawing 5 . - The first inclination major groove 2 the two gradual slope sections 2c1 prolonged until it carries out a opening to first tread edge 4a from the steep slope section 2b, and 2c2 having -- the gradual slope section 2c1 and 2c2 All are said arrangement angle, 65-75 degrees It is 6.5mm about 5mm and a channel depth in a flute width. It carries out. The second inclination major groove 3 a flute width -- 10mm (start edge 3a location) from -- 6mm (second tread edge 4b location) It gradually decreases. up to -- It goes to second tread edge 4b from the start edge 3a location which is in the distance of 43mm from the tire equator 7. The pitch of the two second inclination major grooves by which the angle of the tangent drawn to the second inclination major groove 3 to the tire circumference increases gradually and adjoins 20-75 degrees in the location equally divided into two The supplemental groove 10 prolonged toward the first inclination slot 2 from second tread edge 4b is arranged. The arrangement angle of this supplemental groove 10 is made into 70-75 degrees. In in addition, location of 31mm from second tread edge 4b The first circumferential groove 13 prolonged in the tire circumference and parallel is arranged. Further in location of 31mm from first tread edge 4a The gradual slope section 2c2 of the first inclination major groove 2, and 2c1 The gradual slope slot 15 which extends toward first tread edge 4a from the tire circumference, the second circumferential groove 14 prolonged in parallel, and this second circumferential groove 14 is arranged

over between. It is 2mm about the flute width of the first and the second circumferential groove 13 and 14, a channel depth is set to 5mm. It is said arrangement angle of the gradual slope slot 15, 65-75 degrees It is 6.5mm about 5mm and a channel depth in a flute width. It carries out and is 45mm about said opening pitch length d1, It considered as the almost same structure as the tire shown in an example 1 except having set said opening pitch length d2 to 30mm.

[0035] - the tread pattern which shows the pneumatic tire of the conventional example conventional example to drawing 7 -- having -- tire size 225 / 50R16, tread width of face -- 200mm it is -- in the tread tread section Five straight slots 16a-16e which extend in a tire circumferencial direction, The directivity pattern of the symmetry form which has set and arranged the gap which classifies the tire circumference for two or more inclination slots 17a and 17b which cross, respectively, extend and carry out termination of two circumferential groove 16a and 16b, 16e, and the 16d in the land department from each tread edges 4a and 4b, respectively is formed. The flute widths of the straight slots 16a-16e are 10.5mm, 11.5 mm, 4.0 mm, 11.5 mm, and 10.5 mm, respectively. Each channel depth is 8mm. Moreover, the inclination slots 17a and 17b Both flute widths 4.5mm, A channel depth 6.5mm, The arrangement angle to the tire circumference was made into 50 degrees - 80 degrees, and it considered as the almost same structure as the tire of an example 1 about tire structures other than a tread pattern.

[0036] - The trial for evaluating driving stability in a desiccation road surface (dry) and wastewater nature at the time of the rectilinear propagation transit in a humid road surface and cornering transit about the sample offering tire which carried out test-method **** was performed. Carry out under the conditions to which a trial makes tire internal pressure 2.2 kgf/cm2, and makes a tire load as an equivalent for real vehicle binary-name entrainment, and the driving stability in a desiccation road surface Sport transit of the circuit course of dryness is carried out with various transit modes, and it evaluates with the feeling of the test driver at this time. Moreover, the wastewater nature at the time of rectilinear propagation transit The residual area of the ground plane at the time of transit was measured by 80km/h and 90km, this estimated the humid road surface with a depth of 5mm, and further, the wastewater nature at the time of cornering transit measured the marginal width G at the time of running the humid road surface with a depth of 5mm of 80R, and evaluated it by this. These test results are shown in a table 1. In addition, for which evaluation criteria, the numeric value in a table is the conventional example. The characteristic ratio set to 100 has shown, and each of these numeric values is excellent, so that they is large.

[0037]

[A table 1]

	操縦安定性	排水性A*1	排水性B*2
従来例	100	100	100
実施例1	105	110	120
実施例2	107	105	112
実施例3	108	104	111
実施例4	107	107	117
実施例5	103	108	103

*1：直進走行時

*2：コーナリング走行時

[0038] From the result of a table 1, to the conventional example, examples 1-5 are remarkably excellent in the wastewater nature at the time of cornering transit, and excellent also about dry driving stability and the wastewater nature at the time of rectilinear propagation transit.

[0039]

[Effect of the Invention] According to this invention, without sacrificing other engine performance, the synthetic wastewater engine performance including the wastewater nature at the time of cornering transit increased, the driving stability in a humid road surface improved, and safety increased further. This invention is suitable for using it for a use on which big lateral force acts frequently like especially circuit transit.

[Translation done.]

CLAIMS

[Claim(s)]
[Claim 1] The two or more firsts or second inclination major groove prolonged toward the first or second tread edge in the tread tread section to the tire circumference, respectively in a reverse slope In a pneumatic tire which has a directivity pattern which becomes the arrangement which a gap which classifies the tire circumference, respectively is set and arranged, and each of these inclination major grooves start within sequential touch-down toward a tread edge from the start edge With a vehicles wearing posture of a tire, the first inclination major groove As opposed to the start edge located in a field between the second tread edges and the tire equator which are located in a vehicles outside to the tire circumference at an angle of 10-30 degrees It has the steep slope section of the shape of a straight line prolonged toward the first tread edge located in the vehicles inside. The second inclination major groove Cross the first inclination major groove toward the direction of the second tread edge from the start edge located in a field between the first tread edge and the tire equator, and it extends in the shape of a curve. A pneumatic tire which has an unsymmetrical directivity pattern characterized by an angle of the tangent and the tire circumference which were lengthened to this second inclination major groove to make increasing gradually in 20-80 degrees as it goes in the direction of the second tread edge from the start edge.
[Claim 2] A pneumatic tire according to claim 1 which comes to constitute the first inclination major groove from the steep slope section prolonged from the start edge to near this side of the first tread edge, and the gradual slope section which is prolonged from this steep slope section at a comparatively big angle to the tire circumference, and carries out a opening to the first tread edge.
[Claim 3] The second inclination major groove is a pneumatic tire according to claim 1 or 2 which is continuously prolonged substantially from the start edge and carries out a opening to the second tread edge.
[Claim 4] A flute width of the second inclination major groove is claims 1 and 2 which it comes to gradually decrease from the start edge toward the second tread edge, or a pneumatic tire given in 3.
[Claim 5] The start edge of the first inclination major groove is the tire equator to 25 - 75% of tread half width. Being in a location within the limits, the start edge of the second inclination major groove is 50% of tread half width from the tire equator. A pneumatic tire given in any 1 term of claims 1-4 in a location within the limits.
[Claim 6] A pneumatic tire given in any 1 term of claims 1-5 whose maximum flute widths of the second inclination major groove are a flute width of the steep slope section of the first inclination major groove, and below equivalent.
[Claim 7] A pneumatic tire given in any 1 term of claims 1-6 with larger opening pitch length of a slot which carries out a opening to the second tread edge than opening pitch length of a slot which carries out a opening to the first tread edge.

[Translation done.]